

## PATENT ABSTRACTS OF JAPAN

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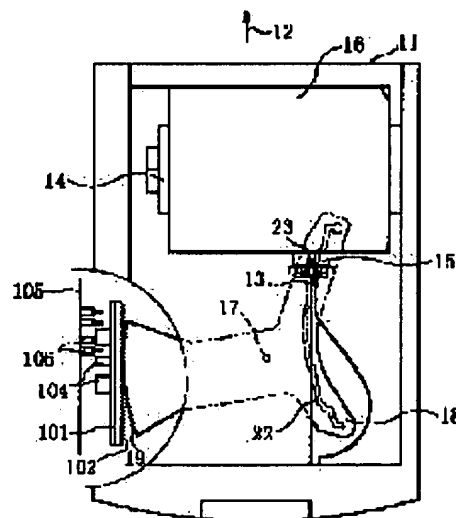
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## (54) PAPER SIZE DETECTING DEVICE

## (57)Abstract:

PROBLEM TO BE SOLVED: To accurately detect the size of paper even in the case of impact being applied to a tray.

SOLUTION: A cam gear 18 is rotated around a fulcrum 17 according to the moving position of a feed direction paper guide moved in a feed direction 12 along a cam groove and a slit 13, and a movable plate 101 is moved in the same direction through teeth 102 provided at one end. A plurality of detecting switches 106 are arranged in positions opposed to the movable guide 101, and their on-off patterns are changed to detect the size of paper. The feed direction paper guide 15 is positively fixed into a desired position by a grip using a spring so as to hardly generate an error to impact. The stepped shape of the cam groove 22 also serves to prevent the generation of an error in the feed direction 12.



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CLAIMS

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[Claim(s)]

[Claim 1] The body of a tray for carrying out two or more sheet laminating of the form of the size of arbitration, and holding it, The feed direction form guide arranged free [ migration to the feed direction and its opposite direction ] so that the end which intersects perpendicularly with the feed direction as a direction where the form held in this body of a tray is sent out may be made to contact the other end when doubling with an orientation, The migration direction means of communication which transmits migration of the feed direction of this feed direction form guide, or its opposite direction as migration of these directions near [ one ] the edge of the feed direction of said body of a tray, and the direction which intersects perpendicularly, Migration of the feed direction which has been arranged near [ one / said ] the edge and was transmitted by the migration direction means of communication, or its opposite direction by the detector style arranged along the feed direction at two or more places Paper-size detection equipment characterized by providing a detection means to detect the size of the form which detects and is held in the body of a tray from the location in the feed direction of said feed direction form guide.

[Claim 2] Said migration direction means of communication is a means to change migration of said feed direction form guide into migration of the feed direction of the member which has irregularity in the feed direction. Two or more locations which said detection means countered in this feed direction with the member which has irregularity, two or more arrangement was carried out and this member moved in the feed direction with the combination of each turning on and off corresponding to the irregularity of said member Paper-size detection equipment according to claim 1 characterized by providing the switch to distinguish.

[Claim 3] The direction of insert and remove of said body of a tray is paper-size detection equipment according to claim 1 characterized by being set up in the direction which intersects perpendicularly with said feed direction.

[Claim 4] It is paper-size detection equipment according to claim 1 which carries out [ that said migration direction means of communication is the step-like migration means of communication which transmits the shape of a step which starts transfer of the migration direction in the phase in which it moved just before the migration location which stops transfer of the migration direction in the section where said feed direction form guide moves in the feed direction towards the location corresponding to a long paper size next from the location corresponding to one paper size, and is equivalent to the following paper size, and ] as the description.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to suitable paper-size detection equipment to use it for the medium tray which is made to move a form in the feed direction and the direction which intersects perpendicularly, and is held in it especially according to a paper size with respect to the paper-size detection equipment used for image processing systems, such as a copying machine, facsimile apparatus, or a printer.

[0002]

[Description of the Prior Art] In image processing systems, such as a copying machine, facsimile apparatus, or a printer, the form of various kinds of sizes is alternatively used according to the purpose of use in many cases. With such equipment, although the cassette tray of dedication is used for every paper size from the start in many cases, various kinds of forms may be used on one tray, setting them each time. A detachable tray is also a kind of the tray of this latter. Thus, it is necessary to detect of which size the form is set to the tray now on the tray which can set various kinds of forms. For this reason, on such a tray, paper-size detection equipment is attached in many cases.

[0003] Drawing 6 expresses an example of the feed equipment which used conventional paper-size detection equipment. With this feed equipment, it has the crosswise form guide 14 whose migration in the direction which intersects perpendicularly with the slit 13 cut in the direction of the feed direction 12 of a form in the body 11 of a tray and this slit 13 was enabled, and the feed direction form guide 15 arranged free [ migration in the feed direction ] along with a slit 13. In order to set the form 16 of the size of arbitration to this body 11 of a tray, according to the cross direction of a form 16, the form guide 14 is moved in the feed direction 12 and the direction which intersects perpendicularly, and the feed direction form guide 15 is moved according to the radical direction of a form 15 about the feed direction 12.

[0004] In the body 11 of a tray, the gearing 18 with a cam which did "Y" character type is stationed free [ rotation ] focusing on the supporting point 17. This gearing 18 with a cam has minced the gear tooth 19 covering predetermined die length to the end side equivalent to the lower limit (it is a diagonally left edge in drawing) of the that "Y" character, and meshes with the gear tooth of the disc-like spur gear 21. The long and slender thing cam groove 22 is minced at the head side which branched to two of the gearings 18 with a cam so that those branching parts may be straddled. The pin 23 which penetrates the slot of this cam groove 22 and both of a slit 13 is attached in the feed direction form guide 15. That is, if the feed direction form guide 15 is moved to the feed direction 12 or its opposite direction, it will move, while a pin 23 \*\*\*\*s to a cam groove 22 according to this, and the gearing 18 with a cam will rotate the supporting point 17 as a core in connection with this. The spur gear 21 which meshed with the gear tooth 19 makes the shaft 25 rotated according to this. This shaft 25 constitutes a part of paper-size detector style explained below.

[0005] Drawing 7 expresses a paper-size detector style. A paper-size detector style at the shaft 25 arranged to space and a perpendicular direction by drawing 6 It has [ spacing / predetermined ] composition placed and attached in the 3rd disk switch 31-33. the 1- which carries out the shape of a disk type and has projection 29 in the piece place, respectively -- these the 1- the actuator 37 of the 1st - the 3rd microswitch 34-36 is arranged in the location corresponding to the 3rd disk switch 31-33, respectively. the 1- each projection 29 of the 3rd disk switch 31-33 is set as different angle of rotation.

[0006] Drawing 8 is for taking the 2nd disk switch for an example and explaining detection actuation of the 2nd corresponding microswitch. If the feed direction form guide 15 shown in drawing 6 is moved to the feed

direction 12 or its hard flow, the gearing 18 ( drawing 6 , drawing 7 ) with a cam will rotate, a spur gear 21 ( drawing 6 , drawing 7 ) will rotate in connection with this, and a shaft 25 will rotate. Thereby, the 2nd disk switch 32 shown in drawing 8 also rotates with other disk switches 31 and 33 ( drawing 7 ). Angle of rotation to which the projection 29 of the 2nd disk switch 32 moves an actuator 37, and operates the 2nd microswitch 35 supports the location which the feed direction form guide 15 stops corresponding to a predetermined paper size. Therefore, paper-size detection equipment can detect that the form of the predetermined paper size is set in the condition that the 2nd microswitch 35 serves as ON. The projection 29 of the 1st and 3rd disk switches 31 and 33 is also set as angle of rotation corresponding to other paper sizes different, respectively, and these will be detected when the form of those paper sizes is set in feed equipment, respectively.

[0007]

[Problem(s) to be Solved by the Invention] With such conventional paper-size detection equipment, the paper-size detector style shown in drawing 7 needed to be designed in the compact for the sake of the convenience which includes this in the body 11 of a tray. Therefore, the size of each disk switches 31-33 shown in drawing 8 or the projection 29 of those needed to be miniaturized, and there was a problem that the detection error of a microswitch 35 was large. That is, with conventional paper-size detection equipment, when it pushed into image processing systems, such as a copying machine which does not illustrate the body 11 of a tray shown in drawing 6 , or actuation which is lengthened to the front for supply of a form was performed, there was a problem that the paper size which changed with the vibration will be detected.

[0008] Then, the purpose of this invention is to offer the paper-size detection equipment which can detect a paper size with a sufficient precision, also when an impact joins a tray.

[0009]

[Means for Solving the Problem] The body of a tray for carrying out two or more sheet laminating of the form of the size of (b) arbitration, and holding it in invention according to claim 1, (b) The feed direction form guide arranged free [ migration to the feed direction and its opposite direction ] so that the end which intersects perpendicularly with the feed direction as a direction where the form held in this body of a tray is sent out may be made to contact the other end when doubling with an orientation, The migration direction means of communication which transmits migration of the feed direction of this feed direction form guide, or its opposite direction as migration of these directions near [ one ] the edge of the feed direction of the body of a tray, and the direction which intersects perpendicularly, (Ha) It is arranged near the edge. While (d)-describing above with the migration direction means of communication Migration of the transmitted feed direction or its opposite direction by the detector style arranged along the feed direction at two or more places Paper-size detection equipment is made to possess a detection means to detect the size of the form which detects and is held in the body of a tray from the location in the feed direction of the above mentioned feed direction form guide.

[0010] Namely, when the feed direction form guide for setting the location of the feed direction of a form and the direction which intersects perpendicularly in invention according to claim 1 moves to the feed direction or its opposite direction for the set of a form, This is made to transmit as migration to the feed direction or its opposite direction with the migration direction means of communication near [ one ] the edge of the feed direction of the body of a tray, and the direction which intersects perpendicularly. The paper size is detected at detector guard arranged along the feed direction at two or more places near this transmitted part. Thus, also when sufficient spacing for detection can be set up unlike the rolling mechanism of the conventional disk and an impact joins a tray by using the detector style arranged along the feed direction at two or more places, a paper size can be detected with a sufficient precision.

[0011] It is a means to change into migration of the feed direction of a member where the migration direction means of communication has irregularity for migration of the feed direction form guide in the feed direction with paper-size detection equipment according to claim 1 at invention according to claim 2. The detection means is characterized by countering in this feed direction with the member which has irregularity, and providing the switch distinguished with the combination of each turning on and off corresponding to the irregularity of the member which described above two or more locations which two or more arrangement was carried out and this member moved in the feed direction.

[0012] That is, in invention according to claim 2, the member which has irregularity in the feed direction moves to the feed direction or its opposite direction with migration of the feed direction form guide, two or more detector styles similarly arranged in the feed direction detect the migration by turning on and off, and a paper

size is detected in those combination. Concavo-convex detection may be performed as detection of a crevice here, and you may carry out as detection of heights. Moreover, also when two or more detector styles move to the feed direction or its opposite direction as arrangement relation completely contrary to this invention according to claim 2, invention according to claim 1 can be applied.

[0013] In invention according to claim 3, the direction of insert and remove of the body of a tray is characterized by being set up in the above mentioned feed direction and the direction which intersects perpendicularly with paper-size detection equipment according to claim 1.

[0014] That is, in invention according to claim 3, it is made to lessen effect to which the impact over the direction of insert and remove at the time of insert and remove gives the direction which carries out the insert and remove of the body of a tray to information processors, such as a copying machine, to detection of a detector style as the feed direction and a direction which intersects perpendicularly as much as possible.

[0015] In invention according to claim 4, with paper-size detection equipment according to claim 1, the migration direction means of communication Transfer of the migration direction is stopped in the section where the feed direction form guide moves in the feed direction towards the location corresponding to a long paper size next from the location corresponding to one paper size. It is characterized by being the step-like migration means of communication which transmits the shape of a step which starts transfer of the migration direction in the phase in which it moved just before the migration location equivalent to the following paper size.

[0016] That is, the migration direction means of communication does not transmit it in proportion [ as it is ] to the time of the feed direction form guide moving to the feed direction or its opposite direction, but he is trying to transmit in the shape of a step in the quantized form by invention according to claim 4. And transfer of the migration direction is stopped in the section where the feed direction form guide moves in the feed direction towards the location corresponding to a long paper size next from the location corresponding to one paper size. Transfer of the migration direction is stopped in the section where it moves in the feed direction towards the location corresponding to a long paper size next from the location corresponding to one paper size although transfer of the migration direction is started in the phase in which it moved just before the migration location equivalent to the following paper size. Since he is trying to start transfer of the migration direction in the phase in which it moved just before the migration location equivalent to the following paper size Also when the feed direction form guide moves to such a location with an impact even if it is a case as the feed direction form guide was somewhat set to the big size side indulgently in location rather than the part corresponding to a paper size or, a paper size can be detected correctly.

[0017]

[Embodiment of the Invention]

[0018]

[Example] This invention is explained to a detail per example below.

[0019] Drawing 1 expresses the feed equipment which used the paper-size detection equipment of one example of this invention. In the body 11 of a tray, the gearing 18 with a cam which did "Y" character type is stationed free [ rotation ] focusing on the supporting point 17. This gearing 18 with a cam has minced the gear tooth 19 covering predetermined die length to the end side equivalent to the lower limit (it is a diagonally left edge in drawing) of the that "Y" character, and meshes with the gear tooth of the disc-like spur gear 21. The long and slender thing cam groove 22 is minced at the head side which branched to two of the gearings 18 with a cam so that those branching parts may be straddled. The pin 23 which penetrates the slot of this cam groove 22 and both of a slit 13 is attached in the feed direction form guide 15. That is, if the feed direction form guide 15 is moved to the feed direction 12 or its opposite direction (the direction of insert and remove of the body 11 of a tray), it will move, while a pin 23 \*\*\*\*s to a cam groove 22 according to this, and the gearing 18 with a cam will rotate the supporting point 17 as a core in connection with this.

[0020] The gear tooth 19 has geared with the gear tooth 102 minced by one side of a movable plate 101, and serves as a pinion and relation of a rack exactly. A movable plate 101 is freely movable to the feed direction 12, or this and an opposite direction with the attachment component which is not illustrated. Therefore, when the gearing 18 with a cam rotates the supporting point 17 as a core, a movable plate 101 will also move to the feed direction 12, or this and an opposite direction. Two or more pieces 104 of switching action keep predetermined width of face and predetermined spacing, respectively, and the movable plate 101 is arranged in the field opposite to the field where the gear tooth 102 was minced. Moreover, on the immobilization member 105 at a

movable plate 101 and the tip of a tray which counters, two or more detection switches 106 keep predetermined spacing, and are arranged.

[0021] Drawing 2 and drawing 3 are for explaining the detection principle of the paper size by migration of a movable plate. According to the paper size by which a movable plate 101 is held in the body 11 ( drawing 1 ) of a tray in these drawings, the migration is suspended in the predetermined location of arrow-head 111 direction. For example, when the migration stops in the location shown in drawing 2 , it counts from the left by a diagram, and the 3rd piece 1043 of switching action actuates the 2nd detection switch [ 2nd ] 1062. moreover -- for example, -- the case where the migration stops in the location shown in drawing 3 -- the 2- the 2nd and 3rd pieces 1042 and 1043 of switching action break in and actuate the 4th detection switch 1062-1064. thus, the halt location of a movable plate 101 -- the 1- 1 or the plurality of the 4th detection switch 1061-1064 serves as ON at coincidence, and the paper size as die length in the feed direction 12 of the form held in the body 11 of a tray with the combination will be detected. And since the actuating direction of each detection switches 1061-1064 is in agreement with the feed direction 12, these detection actuation can be ensured using the stroke at the time of wearing of the body 11 of a tray.

[0022] The paper-size detection equipment of this example is raising the detection precision of a paper size because it was made to detect [ to have arranged the detector style of a paper size in the form extended long and slender in the feed direction near the side plate of a tray, and ] by being parallel with two or more detection switches. Moreover, with the paper-size detection equipment of not only it but this example, generating of malfunction by the vibration when moving the body 11 of a tray to the feed direction 12 or its hard flow is also prevented as much as possible. Then, these cures are also explained.

[0023] Drawing 4 expresses the cross-section structure of a part where the feed direction form guide was attached in the gearing with a cam. The slit 13 shown in drawing 1 is minced by the tray bottom plate 121 which holds a form. The pin 23 is inserted in the feed direction form guide 15 arranged in the form which fits loosely into the guide rails 122 and 122 arranged at the both sides of a slit 13 through the cam groove 22 from the field of the gearing 18 bottom with a cam.

[0024] Drawing 5 shows the halt device of the feed direction form guide over the cam groove of a gearing with a cam. The knob 131 is attached in the side face of the feed direction form guide 15 arranged in the upper part of the gearing 18 with a cam. the compression spring which is not illustrated -- opposing -- this -- \*\*\*\*\* -- pressure of the member to the guide rail 122 shown in drawing 4 R> 4 which is not illustrated is solved by things, and the feed direction form guide 15 becomes movable along with a slit 13 in the feed direction 12 of a form, or its opposite direction by them. When the feed direction form guide 15 stops in the location of the request which becomes settled in relation with a paper size, the member described above to the guide rail 122 by removing a knob 131 presses, and the feed direction form guide 15 has migration in the feed direction prevented.

[0025] Thus, since the feed direction form guide 15 can forbid the migration in the condition of having not gathered \*\*\*\*\* 131, it can prevent certainly the situation which the gearing 18 with a cam rotates delicately to the vibration at the time of moving the body 11 ( drawing 1 ) of a tray, and can prevent incorrect detection of a paper size.

[0026] And as shown in drawing 5 , the cam groove 22 is formed in the feed direction in the shape of [ used as a predetermined length / every / straight-line configuration ] a stairway. This is to make the gearing 18 with a cam not rotate focusing on the supporting point 17, even if the feed direction form guide 15 moves in the one straight-line part. Consequently, with the paper-size detection equipment of this example, even if a pin 23 ( drawing 4 ) moves one straight-line part 141, for example, detection of a paper size serves as as [ one kind ]. Therefore, when an operator is the set of a paper size temporarily and \*\*\*\*\* 131 is fixed in the condition of not applying the feed direction form guide 15 to the edge of a form 16 exactly, or when positioning is performed in the condition that the feed direction form guide 15 is longer than the die length of the feed direction 12 of a form 16, a paper size is not incorrect-detected as "size big one step." This makes it the advantage which prevents the situation where an image processing system forms an image as a bigger form than the actually set paper size produced.

[0027] In addition, this is made to stop the piece of a stop which is interlocked with this by operating \*\*\*\*\* 131 and which is not illustrated, and to the guide rail 122, the stop slot is arranged in the part corresponding to each paper size, and it may be [ a stop with a stop slot is made to cancel and ] made to make migration to the

feed direction 12, or this and an opposite direction prevent, or to enable migration in these directions. moreover -- an example -- the 1- although each switch of the 4th detection switch 1061-1064 was considered as the mechanical detection switch, of course, you may be the switch detected optically or magnetically [0028] Moreover, although the piece 104 of switching action was attached in the movable plate 101 and the movable plate 101 and the switch 106 which the fixed position which counters actuates by the piece 104 of switching action have been arranged in the example, as for this, it is natural that a switch 106 is conversely arranged to a movable plate 101, and you may make it arrange the piece 104 of switching action to a fixed position. Furthermore, as for the piece 104 of switching action, and a switch 106, it is also natural that more than one may be arranged every like an example, and you may make it arrange only two or more one side.

[0029]

[Effect of the Invention] As explained above, when the feed direction form guide for setting the location of the feed direction of a form and the direction which intersects perpendicularly moves to the feed direction or its opposite direction for the set of a form according to invention according to claim 1, This is made to transmit as migration to the feed direction or its opposite direction with the migration direction means of communication near [ one ] the edge of the feed direction of the body of a tray, and the direction which intersects perpendicularly. The paper size is detected at detector guard arranged along the feed direction at two or more places near this transmitted part. Therefore, the body of a tray can be used effectively and it will be useful to the miniaturization of a tray. Moreover, by using the detector style arranged along the feed direction at two or more places in this way, rather than the rolling mechanism of the conventional disk, the manufacture and adjustment become easy and it will contribute to the cost cut of equipment.

[0030] Moreover, according to invention according to claim 2, the member which has irregularity in the feed direction moves to the feed direction or its opposite direction with migration of the feed direction form guide, two or more detector styles similarly arranged in the feed direction detect the migration by turning on and off, and a paper size is detected in those combination. Therefore, detection actuation can be stabilized by performing detection by binary. Moreover, since both move to the feed direction or its opposite direction with migration of the feed direction form guide, it will contribute to the miniaturization of equipment.

[0031] Furthermore, according to invention according to claim 3, effect to which the impact over the direction of insert and remove at the time of insert and remove gives the direction which carries out the insert and remove of the body of a tray to information processors, such as a copying machine, to detection of a detector style as the feed direction and a direction which intersects perpendicularly can be lessened as much as possible.

[0032] Moreover, the migration direction means of communication does not transmit it in proportion [ as it is ] to the time of the feed direction form guide moving to the feed direction or its opposite direction, but he is trying to transmit in the shape of a step in the quantized form according to invention according to claim 4. And transfer of the migration direction is stopped in the section where the feed direction form guide moves in the feed direction towards the location corresponding to a long paper size next from the location corresponding to one paper size. Transfer of the migration direction is stopped in the section where it moves in the feed direction towards the location corresponding to a long paper size next from the location corresponding to one paper size although transfer of the migration direction is started in the phase in which it moved just before the migration location equivalent to the following paper size. Since he is trying to start transfer of the migration direction in the phase in which it moved just before the migration location equivalent to the following paper size Even if it is a case as the feed direction form guide was somewhat set to the big size side indulgently in location rather than the part corresponding to a paper size Or also when the feed direction form guide moves to such a location with an impact, there is an advantage that a paper size is correctly detectable.

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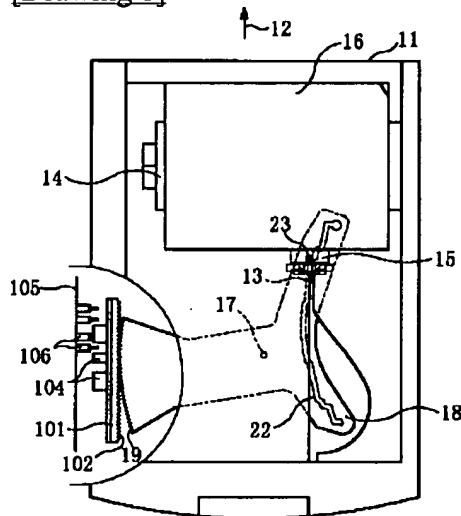
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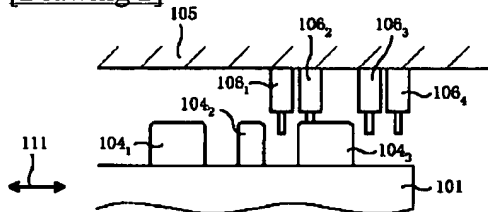
DRAWINGS

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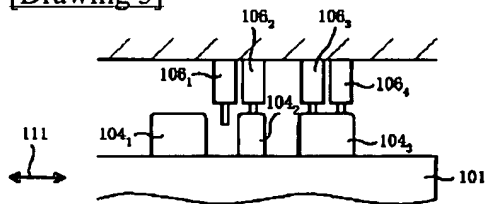
[Drawing 1]



[Drawing 2]

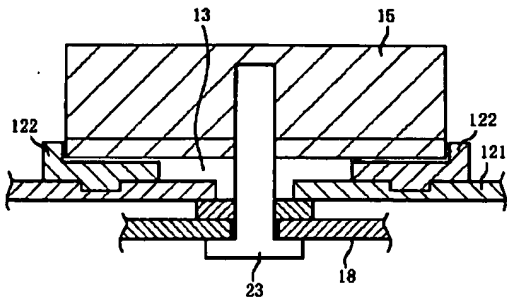


[Drawing 3]

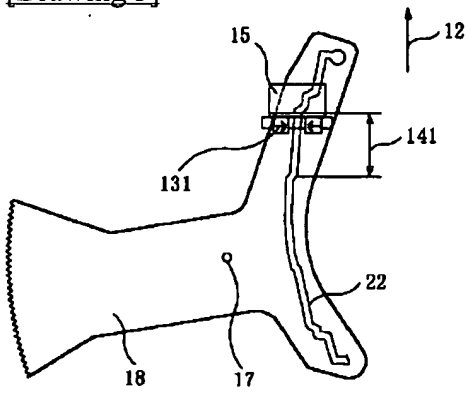


[Drawing 4]

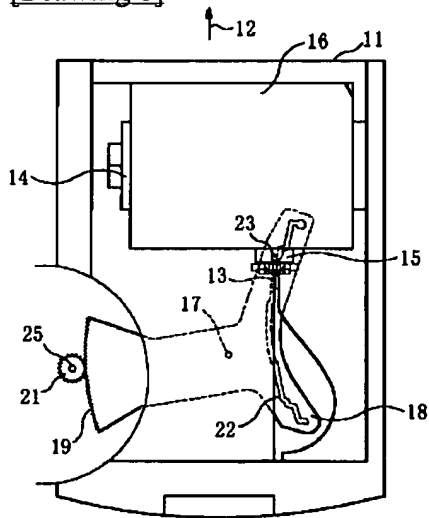




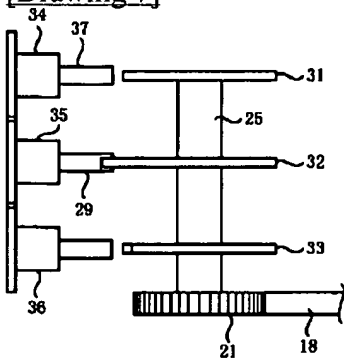
[Drawing 5]



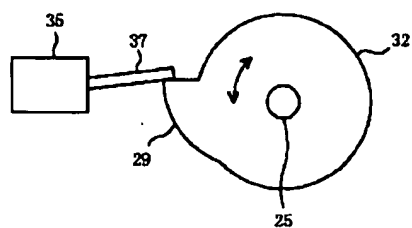
[Drawing 6]



[Drawing 7]



[Drawing 8]



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